



# TEST REPORT



Applicant:	VTECH ELECTRONICS LTD
Address:	23/F BLOCK 1,TAI PING INDUSTRIAL CENTRE,57 TING KOK ROAD,TAI PO,HONG KONG

Manufacturer or Supplier	VTECH ELECTRONICS LTD
Address	23/F BLOCK 1,TAI PING INDUSTRIAL CENTRE,57 TING KOK ROAD,TAI PO,HONG KONG
Product:	SWITCH & GO DINOS TURBO - BRONCO THE RC TRICERATOPS^TM
Brand Name:	VTECH
Model:	80- 1548xx
Additional Model & Model Difference:	N/A
Date of tests:	Jun. 03 ~ Jun. 13, 2014

the tests have been carried out according to the requirements of the following standard:

**FCC Part 15, Subpart C, Section 15.249(2012-10)**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Venless Long Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	
Date: Jun. 16, 2014	

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# TABLE OF CONTENTS

**RELEASE CONTROL RECORD ..... 3**

**1 SUMMARY OF TEST RESULTS..... 4**

**2 MEASUREMENT UNCERTAINTY..... 4**

**3 GENERAL INFORMATION ..... 5**

3.1 GENERAL DESCRIPTION OF EUT ..... 5

3.2 DESCRIPTION OF TEST MODES ..... 6

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS..... 7

3.4 DESCRIPTION OF SUPPORT UNITS..... 7

**4. TEST TYPES AND RESULTS..... 8**

4.1 RADIATED EMISSION MEASUREMENT ..... 8

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT ..... 8

4.1.2 TEST INSTRUMENTS..... 9

4.1.3 TEST PROCEDURES ..... 10

4.1.4 DEVIATION FROM TEST STANDARD ..... 10

4.1.5 TEST SETUP.....11

4.1.6 EUT OPERATING CONDITIONS .....11

4.1.7 TEST RESULTS ..... 12

4.2 20dB BANDWIDTH MEASUREMENT ..... 17

4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT ..... 17

4.2.2 TEST INSTRUMENTS..... 17

4.2.3 TEST PROCEDURE..... 17

4.2.4 DEVIATION FROM TEST STANDARD ..... 17

4.2.5 TEST SETUP..... 18

4.2.6 EUT OPERATING CONDITIONS ..... 18

4.2.7 TEST RESULTS ..... 18

**5 PHOTOGRAPHS OF THE TEST CONFIGURATION ..... 19**

**6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB..... 22**



## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FC140603N053	Original release	Jun. 16, 2014



# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	No antenna connector is used
§15.207 (a)	Conducted Emission	N/A	EUT is powered by Battery
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.249(a)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

# 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.67dB
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	4.36dB
	1GHz ~ 18GHz	3.9dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	SWITCH & GO DINOS TURBO - BRONCO THE RC TRICERATOPS^TM
<b>MODEL NO.</b>	80- 1548xx
<b>FCC ID</b>	G2R-1548
<b>NOMINAL VOLTAGE</b>	TX: DC 3V by Battery
<b>MODULATION TECHNOLOGY</b>	GFSK
<b>OPERATING FREQUENCY</b>	2407MHz-2472MHz
<b>ANTENNA TYPE</b>	Integral PCB Antenna, with 0dBi gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	N/A

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.:140603N053) for detailed product photo.



### 3.2 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and packet type. The worst case was found when the EUT was positioned on X axis for radiated emission. The EUT was tested under the following mode.

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	BW	
-	√	√	-	√	Powered by Battery

Where **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission

**RE≥1G**: Radiated Emission above 1GHz  
**BW**: 20db bandwidth

Following channel(s) was (were) selected for the test as listed below.

TESTED CHANNEL	TESTED FREQUENCY
Low	2407 MHz
Middle	2437 MHz
High	2472 MHz

Note: The more detailed channel, please refer to the product specifications



### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C, Section 15.249(2012-10)**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

**NOTE:** It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B Verification. The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units.



## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.





#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 29,14	Apr. 28,15
EMI Test Receiver	Rohde&Schwarz	ESVS10	841431/004	May 17,14	May 16,15
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Dec. 05,13	Dec. 04,14
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	Jul. 27, 13	Jul. 26, 14
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	Oct. 18, 12	Oct. 17, 14
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Feb. 13,14	Feb. 12,15
Pre-Amplifier (9kHz~1GHz)	SONOMA	310D	186955	Mar. 05,14	Mar. 04,15
Signal Amplifier	Agilent	8447D	2944A10488	Jun. 25,13	Jun. 24,14
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 13,14	May 12,15
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,13	Nov. 03,14
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Jul. 27,13	Jul. 26, 14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 13	Oct. 29, 14
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	N/A	N/A	N/A

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 966 Chamber.
3. The FCC Site Registration No. is 502831.



#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

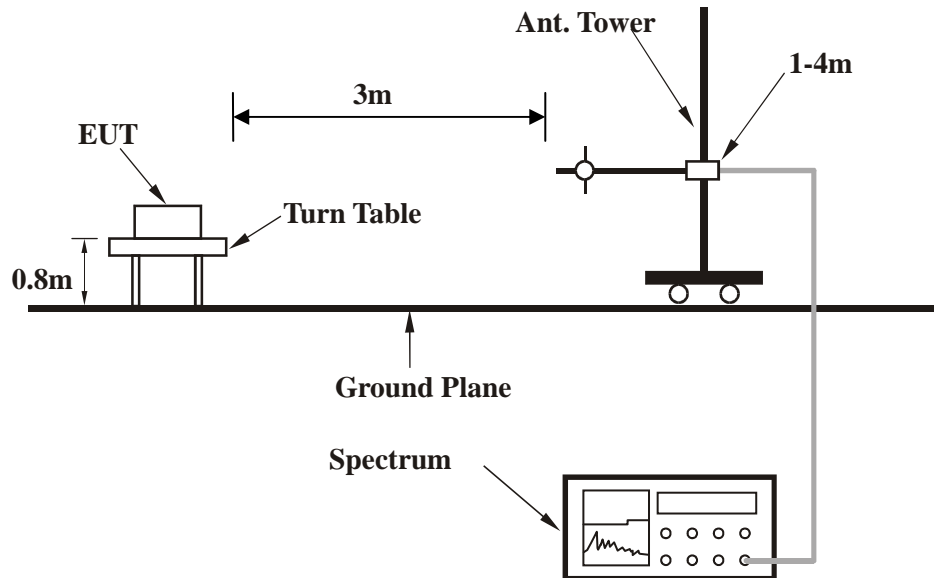
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- a) Turned on the power of all equipment.
- b) EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.



4.1.7 TEST RESULTS

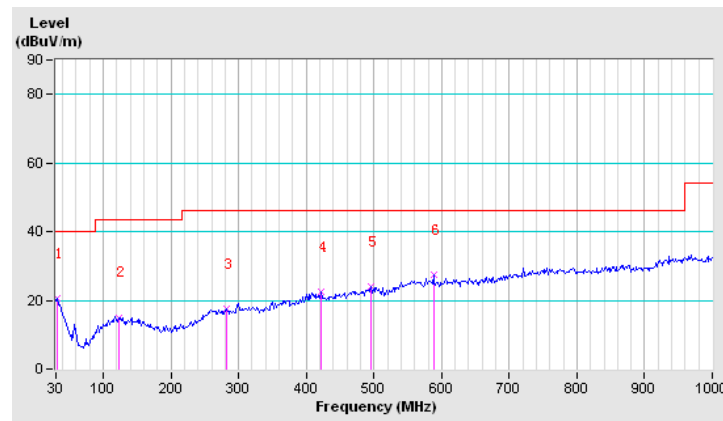
BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	31.62	20.7 QP	40.0	-19.3	1.00 H	254	1.73	18.96
2	122.15	15.1 QP	43.5	-28.4	1.00 H	242	1.39	13.67
3	282.20	17.5 QP	46.0	-28.5	1.00 H	231	1.85	15.68
4	421.23	22.4 QP	46.0	-23.6	1.00 H	218	1.91	20.51
5	495.60	24.0 QP	46.0	-22.0	1.00 H	192	1.61	22.40
6	587.75	27.5 QP	46.0	-18.5	1.00 H	205	2.86	24.63

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



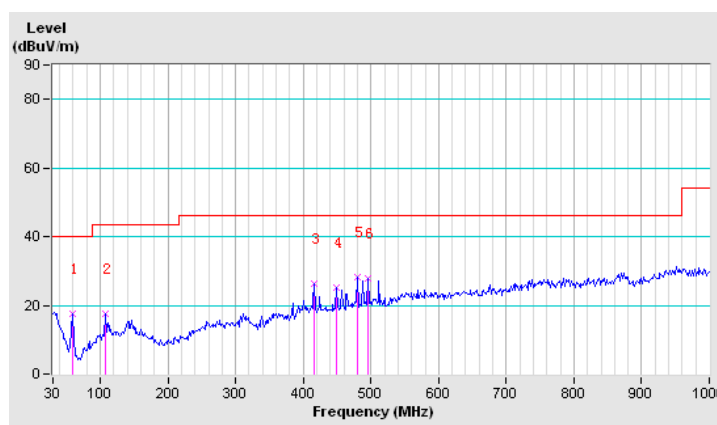


<b>CHANNEL</b>	TX Middle Channel	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	59.10	17.4 QP	40.0	-22.6	1.00 V	78	11.03	6.39
2	107.60	17.6 QP	43.5	-25.9	1.00 V	89	4.85	12.78
3	416.38	26.4 QP	46.0	-19.6	1.00 V	53	5.85	20.53
4	448.72	25.3 QP	46.0	-20.7	1.00 V	65	4.34	20.95
<b>5</b>	<b>479.43</b>	<b>28.3 QP</b>	<b>46.0</b>	<b>-17.8</b>	<b>1.00 V</b>	<b>29</b>	<b>6.47</b>	<b>21.78</b>
6	495.60	28.0 QP	46.0	-18.0	1.00 V	42	5.57	22.40

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





**ABOVE 1GHz WORST-CASE DATA:**

<b>CHANNEL</b>	TX Low Channel	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	42.8 PK	74.0	-31.2	1.00 H	142	6.82	35.98
2	2400.00	34.6 AV	54.0	-19.4	1.00 H	142	-1.38	35.98
3	2407.00	94.0 PK	114.0	-20.0	1.00 H	187	57.97	35.99
4	2407.00	34.5 AV	94.0	-59.5	1.00 H	187	-1.49	35.99
5	4814.00	56.4 PK	74.0	-17.6	1.00 H	240	17.04	39.36
6	4814.00	37.2 AV	54.0	-16.8	1.00 H	240	-2.16	39.36
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	45.2 PK	74.0	-28.8	1.00 V	120	9.22	35.98
2	2400.00	40.9 AV	54.0	-13.1	1.00 V	120	4.92	35.98
3	2407.00	87.3 PK	114.0	-26.7	1.00 V	50	51.35	35.99
4	2407.00	38.2 AV	94.0	-55.8	1.00 V	50	2.21	35.99
5	4814.00	57.5 PK	74.0	-16.5	1.00 V	220	18.14	39.36
6	4814.00	37.8 AV	54.0	-16.2	1.00 V	220	-1.56	39.36

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



<b>CHANNEL</b>	TX Middle Channel	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2437.00	93.9 PK	114.0	-20.1	1.00 H	180	57.87	36.03
2	2437.00	36.4 AV	94.0	-57.6	1.00 H	180	0.37	36.03
3	4874.00	47.7 PK	74.0	-26.3	1.00 H	246	8.33	39.37
4	4874.00	34.7 AV	54.0	-19.3	1.00 H	246	-4.67	39.37
5	7311.00	52.8 PK	74.0	-21.2	1.00 H	270	10.04	42.76
6	7311.00	35.3 AV	54.0	-18.7	1.00 H	270	-7.46	42.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2437.00	86.7 PK	114.0	-27.3	1.00 V	54	50.67	36.03
2	2437.00	36.4 AV	94.0	-57.6	1.00 V	54	0.37	36.03
3	4874.00	47.6 PK	74.0	-26.4	1.00 V	230	8.23	39.37
4	4874.00	33.1 AV	54.0	-20.9	1.00 V	230	-6.27	39.37
5	7311.00	52.9 PK	74.0	-21.1	1.00 V	200	10.14	42.76
6	7311.00	34.1 AV	54.0	-19.9	1.00 V	200	-8.66	42.76

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



<b>CHANNEL</b>	TX High Channel	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2472.00	93.6 PK	114.0	-20.4	1.00 H	182	57.53	36.07
2	2472.00	56.3 AV	94.0	-37.7	1.00 H	182	20.23	36.07
3	2483.50	43.7 PK	74.0	-30.3	1.00 H	182	7.61	36.09
4	2483.50	37.4 AV	54.0	-16.6	1.00 H	182	1.31	36.09
5	4924.00	39.1 AV	54.0	-14.9	1.00 H	242	-0.28	39.38
6	4944.00	55.7 PK	74.0	-18.3	1.00 H	242	16.31	39.39
7	7416.00	57.4 PK	74.0	-16.6	1.00 H	134	14.73	42.67
8	7416.00	46.3 AV	54.0	-7.7	1.00 H	134	3.63	42.67
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2472.00	92.3 PK	114.0	-21.7	1.00 V	56	56.23	36.07
2	2472.00	38.2 AV	94.0	-55.8	1.00 V	56	2.13	36.07
3	2483.50	43.2 PK	74.0	-30.8	1.00 V	56	7.11	36.09
4	2483.50	34.2 AV	54.0	-19.8	1.00 V	56	-1.89	36.09
5	4944.00	59.9 PK	74.0	-14.1	1.00 V	225	20.51	39.39
6	4944.00	35.3 AV	54.0	-18.7	1.00 V	225	-4.09	39.39
7	7416.00	56.4 PK	74.0	-17.6	1.00 V	150	13.73	42.67
8	7416.00	44.5 AV	54.0	-9.5	1.00 V	150	1.83	42.67

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





## 4.2 20dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (10Hz–40GHz)	Rohde&Schwarz	FSV40	101003	Apr. 09,14	Apr. 08,15
Power Meter	Anritsu	ML2495A	1139001	Feb. 21,14	Feb. 20,15
Power Sensor	Anritsu	MA2411B	1126068	Feb. 21,14	Feb. 20,15
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30,13	Oct. 29,14
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep. 17,13	Sep. 16,14
Oscilloscope	Agilent	DSO9254A	MY51260160	Oct. 17, 13	Oct. 16, 14
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 25,13	Nov. 24,14

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

### 4.2.3 TEST PROCEDURE

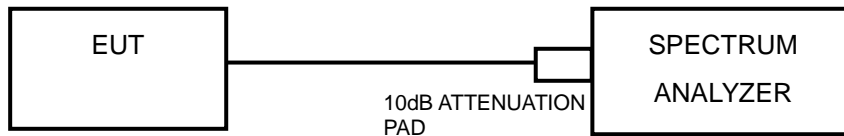
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.



#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITIONS

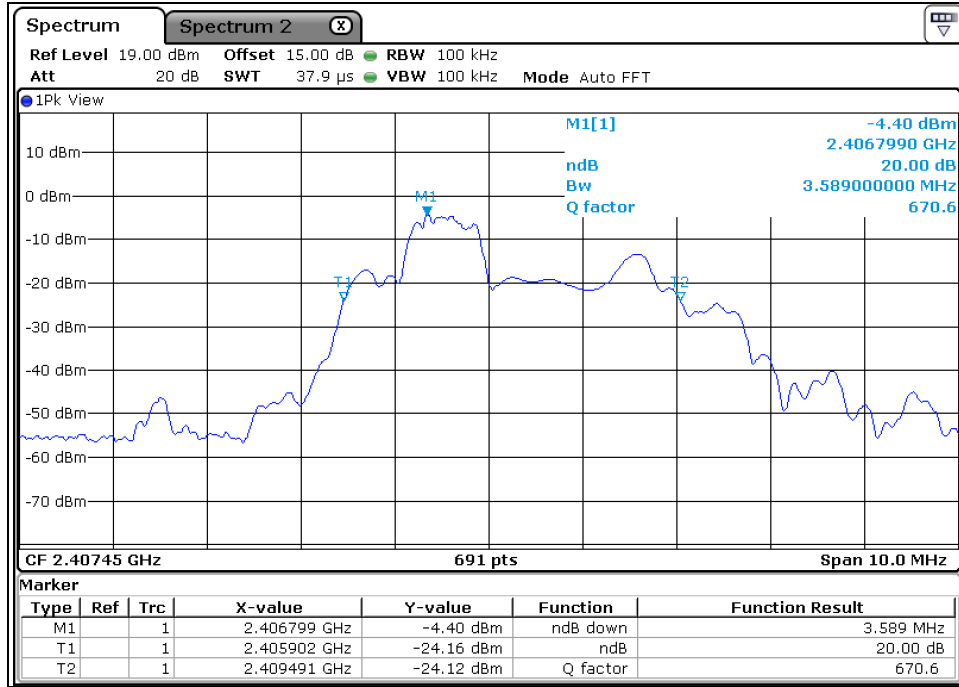
- a) Turned on the power of all equipment.
- b) EUT was operated according to the type used was description in manufacturer’s specifications or the User's Manual.

#### 4.2.7 TEST RESULTS

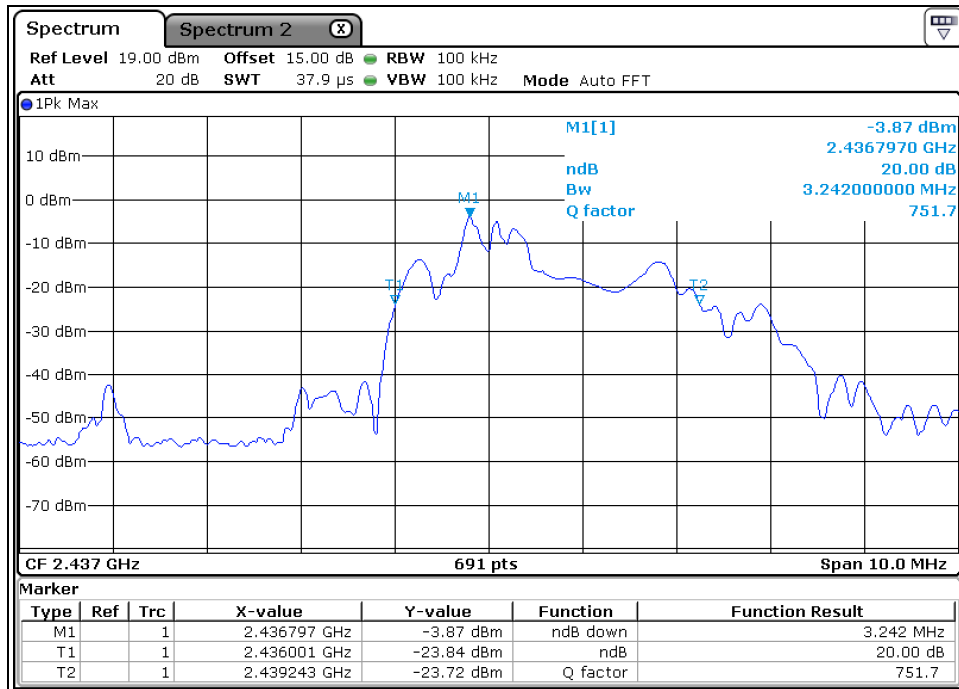
CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2407	3.589
Middle	2437	3.242
High	2472	3.082



Test Data: Low channel



Test Data: Middle channel





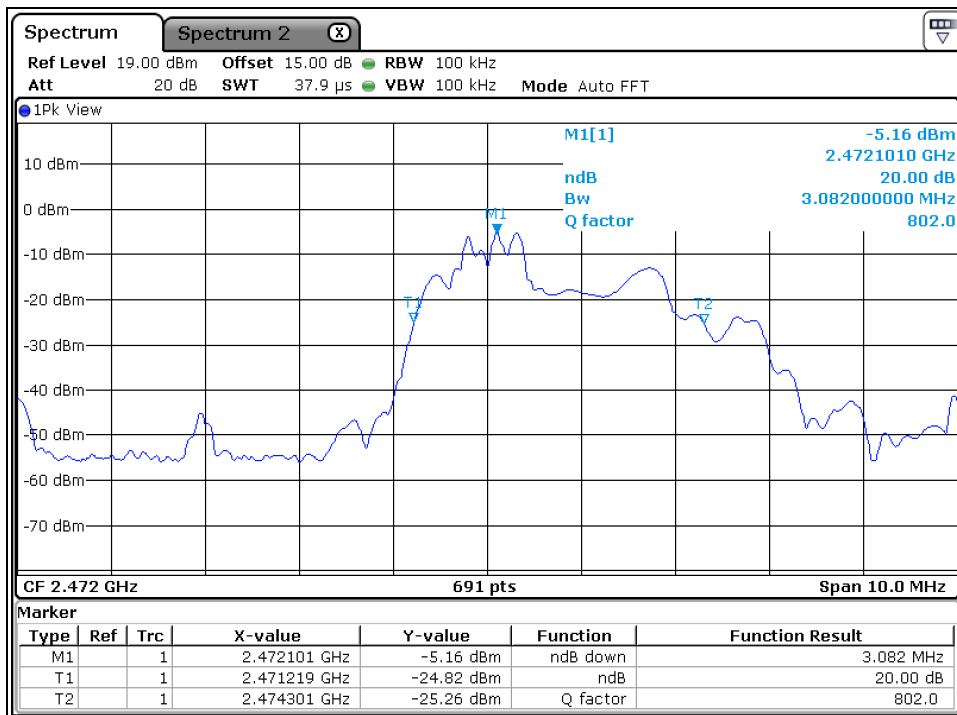
BUREAU VERITAS

Test Report No.: FC140603N053



Test Lab  
Cert 2951.01

Test Data: High channel





## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



## 6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---